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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,424	05/07/2007	Martin Votsmeier	UMICORE 0168-US	8198

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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,424	VOTSMEIER ET AL.	
	Examiner	Art Unit	
	TU M. NGUYEN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-10* is/are rejected.

7)☒ Claim(s) *6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :20060815,20061011,20061016,20070808.

DETAILED ACTION

1. An Applicant's Preliminary Amendment filed on August 15, 2006 has been entered. Claim 7 has been amended. Overall, claims 1-10 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (U.S. Patent 6,341,487).

Re claim 1, as shown in Figures 1 and 16, Takahashi et al. disclose a method for determining the instant at which a nitrogen oxide storage catalyst (9) is switched from the storage phase to the regeneration phase and for diagnosing the storage properties of this catalyst, the nitrogen oxide storage catalyst having a nitrogen oxide filling level and being arranged in the exhaust section (8) of an internal combustion engine (1) operated predominantly with a lean air-fuel ratio, and the filling level (NOX) of the nitrogen oxide storage catalyst being determined (in step S524) continuously during the storage phase by integration of the nitrogen oxide mass stored per unit time at each instant, and the catalyst is switched over (in step S526) on the basis of the filling level which has been reached (step S525 with YES answer), wherein the filling

level of the storage catalyst which remains after regeneration has been carried out is used (in step S530) as the starting value for determining the filling level during the next storage phase.

Re claim 2, in the method of Takahashi et al., the filling level of the storage catalyst which still remains after regeneration has been carried out is determined (in step S530) using at least one of a previously determined dependent relationship between the filling level and the filling level at the start of regeneration, the duration of regeneration, the air-fuel ratio of the exhaust gas during the regeneration, and the exhaust-gas temperature (see lines 6-9 of column 22).

Re claims 3-4, in the method of Takahashi et al., the nitrogen oxide mass stored per unit time at each instant is determined (in step S523) from the prevailing nitrogen oxide conversion rate (NOx trapping rate) and the nitrogen oxide mass flow in the exhaust gas upstream of the catalyst (see lines 56-62 of column 20), wherein to determine the nitrogen oxide conversion rate, the nitrogen oxide mass flow downstream of the catalyst is measured (via NOx sensor (19)) and the nitrogen oxide mass flow upstream of the catalyst is determined on the basis of a mathematical model or with the aid of a nitrogen oxide mass flow which has previously been determined empirically for the corresponding operating point (see lines 1-23 of column 21).

Re claim 5, in the method of Takahashi et al., the nitrogen oxide conversion rate for the instantaneous operating point of the engine is determined (see lines 1-23 of column 21) with the aid of a mathematical model or empirical data for a fully regenerated storage catalyst, and the nitrogen oxide filling level of the storage catalyst is determined (in step S524) from this conversion rate by integration over the operating states of the engine which have occurred since the last regeneration.

Re claim 7, in the method of Takahashi et al., the nitrogen oxide mass flow (NOXS) downstream of the catalyst is additionally measured (in step S521 via NOx sensor (19)).

Re claims 8-9, in the method of Takahashi et al., to diagnose the storage capacity of the nitrogen oxide storage catalyst, the measured nitrogen oxide mass flow (NOXS) downstream of the catalyst is compared (in step S527) with a calculated nitrogen oxide mass flow (NOXSth), the calculated nitrogen oxide mass flow being determined from the nitrogen oxide conversion rate, and the nitrogen oxide mass flow upstream of the catalyst, wherein if the measured nitrogen oxide mass flow exceeds the calculated nitrogen oxide mass flow over a defined period of time and by a predetermined amount (step S527 with Yes answer), it is concluded that the storage capacity of the catalyst has dropped and a sulfur regeneration of the catalyst is initiated (in step S529).

4. Claims 1-5, 7, 8, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimotani et al. (U.S. Patent 6,460,329).

Re claim 1, as shown in Figures 1-3, Shimotani et al. disclose a method for determining the instant at which a nitrogen oxide storage catalyst (2) is switched from the storage phase to the regeneration phase and for diagnosing the storage properties of this catalyst, the nitrogen oxide storage catalyst having a nitrogen oxide filling level and being arranged in the exhaust section (11) of an internal combustion engine (E) operated predominantly with a lean air-fuel ratio, and the filling level (NOxmass) of the nitrogen oxide storage catalyst being determined (in step S15) continuously during the storage phase by integration of the nitrogen oxide mass stored per unit time at each instant, and the catalyst is switched over (in step S17) on the basis of the filling level which has been reached (step S16 with YES answer), wherein the filling level of the storage

catalyst which remains after regeneration has been carried out is used (see step S24) as the starting value for determining the filling level during the next storage phase.

Re claim 2, in the method of Shimotani et al., the filling level of the storage catalyst which still remains after regeneration has been carried out is determined (in step S24) using at least one of a previously determined dependent relationship between the filling level and the filling level at the start of regeneration, the duration of regeneration (step S42), the air-fuel ratio of the exhaust gas during the regeneration (step S17), and the exhaust-gas temperature.

Re claim 3, in the method of Shimotani et al., the nitrogen oxide mass stored per unit time at each instant is determined from the prevailing nitrogen oxide conversion rate and the nitrogen oxide mass flow in the exhaust gas upstream of the catalyst (see step S14).

Re claim 4, in the method of Shimotani et al., to determine the nitrogen oxide conversion rate, the nitrogen oxide mass flow downstream of the catalyst is measured (via NOx sensor (13)) and the nitrogen oxide mass flow upstream of the catalyst is determined (see steps S12-S14) on the basis of a mathematical model or with the aid of a nitrogen oxide mass flow which has previously been determined empirically for the corresponding operating point.

Re claim 5, in the method of Shimotani et al., the nitrogen oxide conversion rate for the instantaneous operating point of the engine is determined (see step S14) with the aid of a mathematical model or empirical data for a fully regenerated storage catalyst, and the nitrogen oxide filling level of the storage catalyst is determined (step S15) from this conversion rate by integration over the operating states of the engine which have occurred since the last regeneration.

Re claim 7, in the method of Shimotani et al., the nitrogen oxide mass flow downstream of the catalyst is additionally measured (via NOx sensor (13)).

Re claim 8, in the method of Shimotani et al., to diagnose the storage capacity of the nitrogen oxide storage catalyst, the measured nitrogen oxide mass flow (RSNOx) downstream of the catalyst is compared (in step S22) with a calculated nitrogen oxide mass flow (RSSL), the calculated nitrogen oxide mass flow being determined from the nitrogen oxide conversion rate, and the nitrogen oxide mass flow upstream of the catalyst.

Re claim 10, as depicted in Figure 3, in the method of Shimotani et al., after repeated sulfur regeneration without success the storage catalyst is replaced.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotani et al. as applied to claim 8 above.

Shimotani et al. disclose the invention as cited above, however, fail to disclose that if the measured nitrogen oxide mass flow exceeds the calculated nitrogen oxide mass flow over a defined period of time and by a predetermined amount, it is concluded that the storage capacity of the catalyst has dropped and a sulfur regeneration of the catalyst is initiated.

It is well known to those with ordinary skill in the art that if the measured nitrogen oxide mass flow in Shimotani et al. exceeds the calculated nitrogen oxide mass flow over a defined period of time and by a predetermined amount, Shimotani et al. concluded that the storage capacity of the catalyst has dropped and a sulfur regeneration of the catalyst is initiated. Therefore, such disclosure by Shimotani et al. is notoriously well known in the art so as to be proper for official notice.

Allowable Subject Matter

7. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Prior Art

8. The IDS (PTO-1449) filed on August 15, 2006, October 11, 2006, October 16, 2006, and August 8, 2007 have been considered. An initialized copy of each is attached hereto.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of four patents: Asanuma et al. (U.S. Patent 5,715,679), Hepburn (U.S. Patent 5,743,084), Ogiso et al. (U.S. Patent 6,729,126), and Manaka (U.S. Patent 6,755,015) further disclose a state of the art.

Communication

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/

TMN

Tu M. Nguyen

September 27, 2009

Primary Examiner

Art Unit 3748